Appendix N.1

Natural Communities Found Within the Lower Wolf Bottomlands Natural Resources Area

Occurrences of the recognized WNHIP natural communities listed below have been documented in the Wolf River basin. The list is followed by short descriptions of each wetland and terrestrial community type as it occurs within the Lower Wolf River Bottomland Natural Resources Area (NRA).

The community descriptions also include information on the status, distribution, and significance of each within the basin. Natural communities are not provided designations for federal or state protection status (NA = not applicable).

Common Name	State Rank[1]	Global Rank[1]	Last observation
Emergent aquatic	S4	G4	2000
Emergent aquatic - wild rice	S3	G?	2000
Floodplain forest	S3	G3?	2001
Hardwood swamp	S3	G4	1999
Lake--oxbow	SU		1978
Lake--shallow, hard, drainage	SU	GU	1979
Lake--shallow, hard, seepage	SU	GU	1987
Northern dry forest	S3	G3?	1978
Northern dry-mesic forest	S3	G4	1999
Northern mesic forest	S4	G4	1999
Northern sedge meadow	S3	G4	2000
Northern wet forest	S4	G4	1983
Northern wet-mesic forest	S3S4	G3?	2001
Open bog	S4	G5	1999
Sand prairie	S2		1999
Shrub-carr	S4	G5	2000
Southern dry-mesic forest	S3	G4	1999
Southern hardwood swamp	S2	G4?	2001
Southern mesic forest	S3	G3?	2000
Southern sedge meadow	S3	G4	2001
Southern tamarack swamp (rich)	S3	G3	2000
Spring pond	S3	GU	1981
Stream--fast, hard, cold	S4	GU	1981
Tamarack (poor) swamp	S3	G4	1999
Wet prairie	SU	G3	1984

1. See Appendix Q for an explanation of the NHI ranking system.

Forest Communities:

Floodplain Forest

This is a lowland hardwood forest community that occurs along larger rivers, that flood periodically, extensive stands occur along the Wolf and Embarrass rivers within the NRA. The best development occurs along large rivers in southern Wisconsin, but this community is also found in the north. In the NRA, silver maple is the most common canopy dominant especially on the lower terraces, while swamp white oak is dominant in some stands on more elevated terraces. Frequent canopy associates include green ash, basswood and bur oak, while cottonwood, river birch and balsam poplar important species elsewhere in Wisconsin, are absent. American elm (Ulmus americana) a former canopy dominant or co-dominant in some stands before it's loss due to Dutch elm disease, was a frequent associate in the subcanopy and sapling layers. Prevalent or characteristic herbs of lower Wolf River system stands include Virgina wild-rye (Elymus virginicus), wood nettle (Laportea canadensis), sedges (Carex lupulina, Carex muskingumensis) cardinal flower (Lobelia cardinalis), fowl manna grass (Glyceria striata), cut-grass (Leersia spp.) calico aster (Aster lateriflorus), sensitive fern (Onoclea sensibilis) and in disturbed areas reed canary (Phalaris arundinacea). Buttonbush (Cephalanthus occidentalis) is a locally dominant shrub and that forms dense thickets on the margins of oxbow lakes, sloughs and ponds within the forest. Lianas such as Virginia creepers (Parthenocissus spp.), grapes (Vitis spp.), Canada moonseed (Menispermum canadense), and poison-ivy (Toxicodendron radicans) which can be quite common in this community type are relatively unimportant here.

Southern Hardwood Swamp (This community partly includes the **Southern Wet-Mesic Forest** of the Curtis classification.)

This is a deciduous forested wetland community type found in insular basins with seasonally high water tables. It is best developed in glaciated southeastern Wisconsin. Within the NRA the composition of this community varies with successional stage and level of past site disturbance. Swamp white oak, bur oak, silver maple and green ash may dominate the later successional, closed canopy sites, while earlier successional and disturbed sites often have low canopy cover and most frequently small diameter trees including cottonwood, green ash, red and silver maple. Standing dead trees may be common and these disturbed sites usually have high shrub cover of dogwood (Cornus spp.) willow (Salix spp.) prickly ash (Xanthoxylum americanum) and in some areas monotypic stands of the invasive exotic reed canary grass (Phalaris arundinacea).

Southern Tamarack Swamp (rich) (formerly called Tamarack Fen)

This forested wetland community type is a variant of the Tamarack Swamp, but occurs south of the Tension Zone within a matrix of "southern" vegetation types. . Stands in the lower wolf river basin study area, though rare, are typical in composition. Poison-sumac (Toxicodendron vernix) and alder (Alnus rugosa) are a dominant understory shrubs. Successional stages and processes are not well understood but fire, windthrow, water level fluctuations, and periodic infestations of larch sawfly are among the important dynamic forces influencing this community. Groundwater seepage influences the composition of most if not all stands. Where the substrate is especially springy, skunk cabbage (Symplocarpus foetidus), marsh marigold Caltha palustris), sedges, and a variety of mosses may carpet the forest floor. Drier, more acid areas or stands may support an ericad and sphagnum dominated

groundlayer. Important or characteristic species include sphagnum moss spp, bluejoint grass (Calamagrotis canadensis), (Carex lasiocarpa), marsh fern (Thelypteris palustris), (Bidens cernua), cinnamon and royal fern (Osmunda cinnamonmea and O. regalis), red maple (Acer rubrum), winterberry (Ilex verticillata), swamp raspberry (Rubus pubescens) and jewelweed (Impatiens capensis).

Tamarack (poor) Swamp (formerly called Tamarack Swamp, this is a split from Curtis' **Northern Wet Forest**)

In the lower wolf river basin this weakly to moderately minerotrophic conifer swamp community is dominated by a densely stocked closed canopy of tamarack (Larix laricina) and black spruce (Abies mariana) and a frequently dense understory of shrubs and saplings including ericads (Vaccinium spp., Gaylussacia, and Chamaedaphne), regenerating tamarack and black spruce, poison sumac (Toxicodendron vernix) and black chokeberry (Aronia melanocarpa). The understory is more diverse than in Black Spruce Swamps and includes more nutrient-demanding species such as winterberry holly (Ilex verticillata). The bryophytes include many genera other than Sphagnum. In areas of spring seepage within these stands, skunk-cabbage (Symplocarpus foetidus) is a common understory inhabitat. These seepage stands have been separated out as a distinct type or subtype in some nearby states and provinces. The flora of this community is more northern in its overall affinities than that of the Southern Tamarack swamp. Important or characteristic in the lower wolf study area stands include Sphagnum spp., cotton-grass (Eriophorum sp), (Carex oligosperma) (Smilicina trifolia) beggar's ticks (Bidens spp.), crested shield fern (Dryopteris cristata), and paper birch (Betula papyrifera).

Northern Wet-mesic Forest (White Cedar Swamp)

This forested minerotrophic wetland is dominated by white cedar (Thuja occidentalis), and occurs on relatively nutrient rich, neutral to alkaline substrates. In the NRA stands typically occur on mucky soils with springy areas, black and green ash (Fraxinus nigra and F. pennsylvanica), tamarack (Larix laricina) and paper birch (Betula papyrifea) as the most common associates. The understory varies from sparse to rich depending upon the site condition and history. Cedar regeneration is virtually absent. Important or characteristic herb species include sedges (such as Carex disperma, C. leptalea, and C. trisperma), orchids (e.g., Platanthera obtusata, Listera cordata), other herbs such as goldthread (Coptis trifolia), fringed polygala (Polygala pauciflora), and naked miterwort (Mitella nuda), and trailing sub-shrubs such as twinflower (Linnaea borealis) and creeping snowberry (Gaultheria hispidula). A number of rare plants occur more frequently in the cedar swamps than in any other habitat. This community is currently uncommon in the study area though it is likely that some stands of disturbed hardwood swamp were formerly this type.

Hardwood Swamp (this is a split from Curtis' **Northern Wet-Mesic Forest**)

These are floristically northern deciduous forested wetlands that occur along lakes, smaller streams, or in insular basins in poorly drained morainal landscapes. This community type is rare in the NRA, where only one stand is documented. The dominant tree species in that stand is black ash (Fraxinus nigra), with red maple (Acer rubrum), paper birch (Betula papyrifera) and bur oak (Quercus macrocarpa) as associates. Standing dead trees are common. Yellow birch, and (formerly) American elm (Ulmus americana) may be important in other regions but were unimportant here. These stands also featured a diverse sparse to dense shrub layer of winterberry holly (Ilex verticillata), poison sumac (Toxicodendron vernix), nannyberry (Virburnum lentago), slender and pussy willow (Salix petiolaris, S. discolor). The herbaceous layer is sedge dominated, with tussock and bottlebrush sedge (Carex stricta and C. comosa) most prevalent. Other characteristic herbs included beggar's ticks (Bidens frondosus), marsh-marigold (Caltha palustris), swamp loosestrife (Lysimachia thyrsiflora), nightshade

(Solanum dulcamara), bog clearweed (Pilea fontana), American water-horehound (Lycopus americanus) and duckweed (Lemna spp.)

Northern Mesic Forest

This forest complex covered the largest acreage of any Wisconsin vegetation type prior to European settlement. Sugar maple (Acer saccharum) is dominant or co-dominant in most stands, while hemlock (Tsuga canadensis) was the second most important species, sometimes occurring in nearly pure stands with white pine (Pinus strobus). Beech (Fagus grandifolia) can be a co-dominant with sugar maple in the counties near Lake Michigan and as far west as the Wolf River basin. The groundlayer varies from sparse and species poor (especially in hemlock stands) with woodferns (especially Dryopteris intermedia), bluebead lily (Clintonia borealis), clubmosses (Lycopodium spp.), and Canada mayflower (Maianthemum canadense) prevalent, to lush and species-rich with diverse, dense spring ephemeral displays. After old-growth stands were cut, trees such as quaking and bigtoothed aspens (Populus tremuloides and P. grandidentata), white birch (Betula papyrifera), and red maple (Acer rubrum) became and still are important in many second-growth Northern Mesic Forests. Several distinct associations within this complex warrant recognition as communities, and draft abstracts of these are currently undergoing review. Within the NRA, sugar maple is the overwhelming dominant in most stands, including those that have been selectively logged or maintained as sugar bushes, while beech, hemlock, basswood, red oak and white ash are frequent associates. Yellow birch a frequent associate in more northern stands, is of very low importance here. Northern mesic forests reach their southern range limits in this area.

Northern Dry-mesic Forest

Mature stands of this type are rare in the study area. The surveyed sites invariably had a history of logging. Dominants are white and red pines (Pinus strobus and P. resinosa), mixed with red oak (Quercus rubra) and red maple (Acer rubrum). Aspen (Populus spp.), paper birch (Betula papyrifera) and other oaks (Q. macrocarpa, Q. alba, and Q ellipsoidalis) are additional associates. The shrub layer, where well developed, includes hazelnuts (Corylus spp.), blueberries (Vaccinium spp.), huckleberry (Gaylussacia baccata) raspberries (Rubus spp.), maple-leaved virburnum (Viburnum acerifolium), witch-hazel (Hamamelis virginianum) wintergreen (Gaultheria procumbens), and partridge-berry (Mitchella repens). Dominant herbs included bracken fern (Pteridium aquilinum), wild sarsaparilla (Aralia nudicaulis), Pennsylvania sedge (Carex pensylvanica), Canada mayflower (Maianthemum canadense), starflower (Trientalis borealis) and large-leaved aster (Aster macrophyllus). Stands usually occur on sandy loams, sands or sometimes rocky soils.

Southern Dry-mesic Forest***Note: NRA example is very unrepresentative of the type**

Typically red oak (Quercus rubra) is a common dominant tree of this upland forest community type. White oak (Q. alba), basswood (Tilia americana), sugar and red maples (Acer saccharum and A. rubrum), and white ash (Fraxinus americana) are also important. The herbaceous understory flora is diverse and includes many species listed under Southern Dry Forest plus jack-in-the-pulpit (Arisaema triphyllum), enchanter's-nightshade (Circaea lutetiana), large-flowered bellwort (Uvularia grandiflora), interrupted fern (Osmunda claytoniana), lady fern (Athyrium filix-femina), tick-trefoils (Desmodium glutinosum and D. nudiflorum), and hog peanut (Amphicarpaea bracteata) . To the detriment of the oaks, mesophytic tree species are becoming increasingly important under current management practices and fire suppression policies.

Southern Mesic Forest

Mature stands of this upland forest community are rare within the NRA. They occur on rich, well-drained soils in uplands, or on higher rarely flooded terraces along rivers and streams. The dominant

tree species is sugar maple (Acer saccharum), but basswood (Tilia americana) and red oak (Quercus rubra) may be co-dominant. Many other trees are found in these forests including ashes, beech, and members of the walnut family (Juglandaceae). On relatively undisturbed sites with high canopy closure, the understory is typically open (sometimes brushy with prickly ash where there is a past history of grazing) and may support lush continuous carpets of fspring ephemerals. Characteristic herbs of stands in the NRA include spring-beauty (Claytonia virginica), maiden hair fern (Adiantum pedatum) trout-lilies (Erythronium spp.), toothworts (Dentaria spp.), bloodroot (Sanguinaria canadensis), wild blue phlox (Phlox divaricata), mayapple (Podophyllum peltatum), and Virginia waterleaf (Hydrophyllum virginianum). Though most stands noted in the Lower Wolf Basin were small and isolated, several adjoin the extensive forested floodplains of the lower Wolf and Embarrass Rivers. Past grazing and logging has affected the composition and structure of most, if not all, surveyed stands.

Shrub Communities:

Alder Thicket

These wetlands are dominated by thick growths of tall shrubs, especially speckled alder (Alnus incana). Among the common herbaceous species are Canada bluejoint grass (Calamagrostis canadensis), orange jewelweed (Impatiens capensis), several asters (Aster lanceolatus, A. puniceus, and A. umbellatus), boneset (Eupatorium perfoliatum), rough bedstraw (Galium asprellum), marsh fern (Thelypteris palustris), arrow-leaved tearthumb (Polygonum sagittatum), and sensitive fern (Onoclea sensibilis). This type is common and widespread in northern and central Wisconsin, but also occurs in the southern part of the state. Alder thickets were not a survey priority in this study, but this community can be important for rare species such as the wood turtle (Clemmys insculpta) and bog bluegrass (Poa paludigena).

Open Bog

Open bogs are uncommon in the study area. These non-forested bogs are acidic, low nutrient, northern Wisconsin peatlands dominated by sphagnum mosses that occur in deep layers, often with pronounced hummocks and hollows. Ericaceous shrubs are important in this community and a good diversity of this group was found in the NRA stands including bog laurel (Kalmia polifolia), leatherleaf (Chamaedaphne calyculata), labrador tea (Ledum groenlandicum), blueberries and cranberries (Vaccinium oxycoccus and V. myrtilloides). As with examples of this type elsewhere, stands in the study area have relatively low vascular herb diversity and are dominated by only a few species, such as few-seeded sedge (Carex oligosperma), and cotton-grasses (especially Eriophorum spissum). While vascular plant diversity is low in open bogs it includes characteristic and habitat distinctive specialists. Trees are absent or achieve very low cover values, as this community is closely related to and intergrades with Muskeg. Stands south of the tension zone are referred to as **Bog Relicts**.

Shrub-carr

Few examples of this community type of been surveyed in the study area although many are present. This type is common and widespread in southern Wisconsin and it also occurs in northern Wisconsin. Thoroughout its range in the state, this wetland community is dominated by tall shrubs such as red-osier dogwood (Cornus stolonifera), meadow-sweet (Spiraea alba), and various willows (e.g., Salix discolor, S. bebbiana, S. gracilis and S. petiolaris). Canada bluejoint grass (Calamagrostis canadensis) is often very common. Associates are similar to those found in Alder Thickets and tussock-type Sedge

Meadows In the study area only one example was surveyed and it is willow and alder dominated (Alnus rugosa, Salix discolor, and S. petiolaris), with poison sumac (Toxicodendron vernix) and bog birch (Betula pumila) also prevalent. Sedges dominate the herb layer (Carex lacustris, C. lasiocarpa and C. stricta) and bluejoint is also prevalent, cattails (Typha latifolia) and purple loosestrife (Lythrum salicaria) are common as well. On disturbed sites reed canary grass (Pharalis arundinacea) may become the dominant herb. Long period of fire suppression and hydrologic disruption have increased shrub-carr, usually at the expense of sedge meadow, wet prairie, and hardwood swamp communities.

Herbaceous Communities:

Sand Prairie (or Dry Prairie)

Native stands of this prairie community type are rare within the study area. Restored sites (where planting has augmented existing prairies or created new ones) are present but the only documented remnant example of this dry grassland community is a disturbed site supporting a mix of native prairie species and weeds. In this stand raspberry clones (Rubus spp.) are common, and sweetfern (Compotonia peregrina) is scattered throughout. The herb layer is somewhat sparse and relatively evenly distributed among bracken fern (Pteridium aquilinum), Pennsylvania sedge (Carex pensylvanica), little and big bluestem (Schizachyrium scoparium, Andropogon gerardii), hawkweeds (Hieracium aurantiacum and H. piloselloides) field sage-wort (Artemesia caudata), and the weeds, smooth brome (Bromus inermis), sheep sorrel (Rumex acetosella), knapweed (Centaurea maculosa) and sagewort (Artemsia absinthium). In Wisconsin, at least some stands are barrens remnants now lacking appreciable woody cover, though extensive stands may have occurred historically on broad level terraces along the Mississippi, Wisconsin, Black, and Chippewa Rivers.

Emergent Aquatic

This community type is fairly common in the NRA, occurring in marsh, lake, and riverine habitats with permanent standing water. They are dominated by robust emergent macrophytes, in pure stands of single species or in various mixtures. The most frequent and overwhelming dominant is broad-leaved cattail (Typha latifolia) especially on sites disturbed by ditching and subsequent diking. Locally, on lake edges, in bayous and abandoned oxbow lakes, other species are dominant, co-dominant or prevalent including, giant reed (Phragmites australis), bulrushes (particularly Scirpus fluviatilis, and S. validus), common bur-reed (Sparganium eurycarpum), sedges (Carex lacustris and C. stricta) pickerel-weed (Pontederia cordata), and arrowheads (Sagittaria spp.). Shrub and tree cover are low, though buttonbush (Cephalanthus occidentalis) was sometimes reported in surveyed stands.

Emergent Aquatic - Wild Rice

The NRA stands of wild rice marsh occur in abandoned oxbows of the Wolf River and in the sheltered waters of marshy lakes and estuaries. Some of these were undoubtedly planted. This community is an emergent macrophyte type, with wild rice (both Zizania aquatica and Z. palustris dominated beds are present) as the predominant species, open water areas of stands typically include submergent aquatic beds. Additional emergent associates differ between sites in the study area, and include common water-plaintain (Alisma plantago-aquatica), arrowheads (Sagitarria spp.), river bulrush (Scirpus fluviatilis), common reed (Phragmites australis) and water-parsnip (Sium suave). The substrate usually consists of poorly consolidated, semi-organic sediments. Water fertility is low to moderate, and current is slow or absent. Wild rice beds have great cultural significance to native peoples, and are important wildlife habitats.

Northern Sedge Meadow

This open wetland community is dominated by sedges and grasses. There are several common subtypes, all of which occur in the study area: Tussock meadows, dominated by tussock sedge (Carex stricta) and Canada bluejoint grass (Calamagrostis canadensis); Broad-leaved sedge meadows, dominated by the robust sedges (Carex lacustris and/or C.rostrata); and Wire-leaved sedge meadows, dominated by woolly sedge (Carex lasiocarpa). Associates vary between stands in the study area and include bog panicled sedge (Carex diandra), marsh bellflower (Campanula aparinoides) the bulrushes (Scirpus validus and S. cyperinus), marsh fern (Thelypteris palustris) joy-pye-weed (Eupatorium

maculatum), tufted loosestrife (Lysimachia thyrsiflora), and manna grasses (Glyceria spp.). These meadows may intergrade with shrub-carr, alder thickets and bog communities, and while shrubs maybe present in this community their coverage is usually low, willows (Salix spp.), bog birch (Betula pumila), and meadowsweet (Spirea alba) are the most frequent species. In some disturbed areas and edges, reed canary (Phalaris arundinacea) and purple loosestrife (Lythrum salicaria) are invading these meadows. Several relatively large stands were documented within the lower Wolf Basin.

Submergent Aquatic

This herbaceous aquatic macrophyte community occurs in lakes, ponds, and rivers, and is common mostly occurring in small patches, within the NRA. Small stands have generally been treated as inclusions within other community types (particularly both emergent marsh types). Submergent macrophytes often occur in deeper water than emergents, but there is considerable overlap. Dominants include various species of pondweeds (Potamogeton spp.) along with waterweed (Elodea canadensis), slender naiad (Najas flexilis), eel-grass (Vallisneria americana), and species of water-milfoil (Myriophyllum) and bladderworts (Utricularia). In the NRA, stands are best developed in the sheltered waters of marshy lake edges and abandoned oxbows, along the main stem of the Wolf river. Beds of american lotus (Nelumbo lutea), a species that is rare in the inland waters of Wisconsin, occur in the protected waters of northern Lake Poygan.

Southern Sedge Meadow

Widespread in southern Wisconsin, this open wetland community is most typically dominated by tussock sedge (Carex stricta) and Canada bluejoint grass (Calamagrostis canadensis). Carex lanuginosa, lake sedge (Carex lacustris) and bulrushes (Scirpus spp.) may also be dominants or associates within the lower wolf basin study area. Common associates are water-horehound (Lycopus uniflorus), panicled aster (Aster simplex), blue flag (Iris virginica), Canada goldenrod (Solidago canadensis), spotted joe-pye-weed (Eupatorium maculatum), broad-leaved cat-tail (Typha latifolia), and swamp milkweed (Asclepias incarnata). Reed canary grass (Phalaris arundinacea) may be dominant in grazed and/or ditched stands. Ditched stands can succeed quickly to Shrub-Carr. In the NRA undisturbed stands are rare, as this type has been frequently impacted by ditching, draining and diking.

Wet Prairie

This is a rather heterogeneous tall grassland community that shares characteristics of prairies, Southern Sedge Meadow, Calcareous Fen and even Emergent Aquatic communities. The Wet Prairie's more wetland-like character can mean that sometimes very few true prairie species are present. Many of the stands assigned to this type by Curtis are currently classified as Wet-Mesic Prairies. The dominant graminoids are Canada bluejoint grass (Calamagrostis canadensis), cordgrass (Spartina pectinata), and prairie muhly (Muhlenbergia glomerata), plus several sedge (Carex) species including lake sedge (C. lacustris), water sedge (C. aquatilis), and woolly sedge (C. lanuginosa). Many of the herb species are shared with Wet-Mesic Prairies, but the following species are often prevalent: New England aster (Aster novae-angliae), swamp thistle (Cirsium muticum), northern bedstraw (Galium boreale), yellow stargrass (Hypoxis hirsuta), cowbane (Oxypolis rigidior), tall meadow-rue (Thalictrum dasycarpum), golden alexander (Zizea aurea), and mountain-mint (Pycnanthemum virginianum). This prairie type is very rare within the study area, and the remnant stands examined were small and somewhat degraded.

Primary Communities:

None identified to date in the Lower Wolf River Bottomlands Natural Resources Area.

Miscellaneous Cover Types:

Aspen Forest – Forests or thickets composed primarily of trembling aspen (Populus tremuloides). Aspen stands can also be composed wholly or partially of bigtooth aspen (P. grandidentata) or balsam poplar (P. balsamifera). Because this cover type can and does occur on a wide variety of sites, there are few, if any, consistent associates.

Red Pine Plantation – Monotypic stands of planted red pine (Pinus resinosa) are present, though not common in the southeastern portion of the basin. Most, though not all plantings, are on dry sites with sandy soils.

CRP Grassland – The purpose of this federal program is to provide semi-permanent cover for wildlife and achieve increased erosion control.

Reed canary grass meadow – The aggressive Eurasian genotype of this grass (Phalaris arundinacea) can dominate open wetlands, replacing or excluding native species. Heavy grazing, cultivation, siltation, and ditching are among the factors that can facilitate its spread. Formerly it was planted as forage for farm animals and for erosion control purposes.

Appendix N.2

Natural Communities Found Outside of the Lower Wolf Bottomlands Natural Resources Area

Generalized descriptions of recognized NHI natural community types present in the Wolf River Basin that are not documented within the Lower Wolf River Bottomlands Natural Resources Area (Epstein et al 2002)**.**

Forests

Southern Dry Forest

Oaks are the dominant species in this upland forest community of dry sites. White oak (Quercus alba) and black oak (Quercus velutina) are dominant, often with admixtures of red and bur oaks (Q. rubra and Q. macrocarpa) and black cherry (Prunus serotina). In the well-developed shrub layer, brambles (Rubus spp.), gray dogwood (Cornus racemosa), and American hazelnut (Corylus americana) are common. Frequent herbaceous species are wild geranium (Geranium maculatum), false Solomon's-seal (Smilacina racemosa), hog-peanut (Amphicarpaea bracteata), and woodland sunflower (Helianthus strumosus). This community type is uncommon in the Wolf River Basin.

Northern Wet Forest

These weakly minerotrophic conifer swamps, located in the North, are dominated by black spruce (Picea mariana) and tamarack (Larix laricina). Jack pine (Pinus banksiana) may be a significant canopy component in certain parts of the range of this community complex. Understories are composed mostly of sphagnum (Sphagnum spp.) mosses and ericaceous shrubs such as leatherleaf (Chamaedaphne calyculata), Labrador-tea (Ledum groenlandicum), and small cranberry (Vaccinium oxycoccos) and sedges such as (Carex trisperma and C. paupercula). The Natural Heritage Inventory has split out two entities, identified (but not strictly defined) by the two dominant species (see **Black Spruce Swamp** and **Tamarack (Poor) Swamp**). Many stands of this wetland forest type have been surveyed in the Wolf River Basin, though all but one site was last visited in the early 1980's. These older records are site based and generally lack detailed descriptive data, making their classification as this type preliminary.

Savanna/Woodlands

Oak Barrens

Black oak (Quercus velutina) is the dominant tree in this fire-adapted savanna community of xeric sites, but other oaks may also be present. Common understory species are lead plant (Amorpha canescens), black-eyed susan (Rudbeckia hirta), round-headed bush clover (Lespedeza capitata), goat's rue (Tephrosia virginiana), june grass (Koeleria cristata), little bluestem (Schizachyrium scoparium),

flowering spurge (Euphorbia corollata), frostweed (Helianthemum canadense), false Solomon's-seals (Smilacina racemosa and S. stellata), spiderwort (Tradescantia ohioensis), and lupine (Lupinus perennis). Distribution of this community is mostly in southwestern, central, and west central Wisconsin, it rare in the Wolf River Basin.

Pine Barrens

This savanna community is characterized by scattered jack pines (Pinus banksiana), or less commonly red pines (P. resinosa), sometimes mixed with scrubby Hill's and bur oaks (Quercus ellipsoidalis and Q. macrocarpa), interspersed with openings in which shrubs such as hazelnuts, (Corylus spp.) and prairie willow (Salix humilis) and herbs dominate. The flora often contains species characteristic of "heaths" such as blueberries (Vaccinium angustifolium and V. myrtilloides), bearberry (Arctostaphylos uva-ursi), American hazelnut (Corylus americana), sweet fern (Comptonia peregrina), and sand cherry (Prunus pensylvanica). Also present are dry sand prairie species such as june grass (Koeleria macrantha), little bluestem (Schizachyrium scoparium), silky and sky-blue asters (Aster sericeus and A. azureus), lupine (Lupinus perennis), blazing-stars (Liatris aspera and L. cylindracea), and western sunflower (Helianthus occidentalis). Pines may be infrequent, even absent, in some stands in northern Wisconsin and elsewhere because of past logging, altered fire regimes, and an absence of seed source. Stands of this barrens community are rare in the Wolf River Basin.

Shrub communities

Muskeg

Muskegs are cold, acidic, sparsely wooded northern peatlands with **composition** similar to the Open Bogs (Sphagnum spp. mosses, Carex spp., and ericaceous shrubs), but with scattered stunted trees of black spruce (Picea mariana) and tamarack (Larix laricina). Plant diversity is typically low, but the community is important for a number of boreal bird and butterfly species, some of which are quite specialized and not found in other communities. This community type is uncommon in the NRA. Portions of Hortonville Bog SNA have the characteristic structure and composition of this community.

Herbaceous upland communities

Dry Prairie

This grassland community occurs on dry, often loess-derived soils, usually on steep south or west facing slopes or at the summits of river bluffs with sandstone or dolomite near the surface. Short to medium-sized prairie grasses: little bluestem (Schizachyrium scoparium), side-oats grama (Bouteloua curtipendula), hairy grama (B. hirsuta), and prairie dropseed (Sporobolus heterolepis), are the dominants in this community. Common shrubs and forbs include lead plant (Amorpha canescens), silky aster (Aster sericeus), flowering spurge (Euphorbia corollata), purple prairie-clover (Petalostemum purpureum), cylindrical blazing-star (Liatris cylindracea), and gray goldenrod (Solidago nemoralis). Stands on gravelly knolls in the Kettle Moraine region of southeastern Wisconsin and along the St. Croix River on the Minnesota – Wisconsin border may warrant recognition, at least at the subtype level. Stands of this dry type are very rare in the Wolf River Basin.

Herbaceous wetland communities

Calcareous Fen

An open wetland found in southern Wisconsin, often underlain by a calcareous substrate, through which carbonate-rich groundwater percolates. The flora is typically diverse, with many calciphiles. Common species are several sedges (Carex sterilis and C. lanuginosa), marsh fern (Thelypteris palustris), shrubby cinquefoil (Potentilla fruticosa), shrubby St. John's-wort (Hypericum kalmianum), Ohio goldenrod (Solidago ohioensis), grass-of-parnassus (Parnassia glauca), twig-rush (Cladium mariscoides), brook lobelia (Lobelia kalmii), boneset (Eupatorium perfoliatum), swamp thistle (Cirsium muticum), and asters (Aster spp.). Some fens have significant prairie or sedge meadow components, and intergrade with those communities. Stands of this fen type are uncommon in the Wolf River Basin, and restricted to its southern half.

Coastal Plain Marsh

Sandy to peaty-mucky lakeshores, pondshores, depressions, and ditches in and around the bed of extinct glacial Lake Wisconsin may harbor assemblages of wetland species including some which are significantly disjunct from their main ranges on the Atlantic Coastal Plain. There is often a well-developed concentric zonation of vegetation. Frequent members of this community are sedges in the genera Cyperus, Eleocharis, Fimbristylis, Hemicarpha, Rhynchospora and Scirpus; rushes (Juncus spp.); milkworts (Polygala cruciata and P. sanguinea), toothcup (Rotala ramosior), meadow-beauty (Rhexia virginica), grass-leaved goldenrod (Euthamia graminifolia), hardhack (Spiraea tomentosa), lance-leaved violet (Viola lanceolata), and yellow-eyed grass (Xyris torta). Stands of this marsh community are rare in the Wolf River Basin.

Poor Fen

This acidic, weakly minerotrophic peatland type is similar to the Open Bog, but can be differentiated by higher pH and nutrient availability, as well as floristics. Sphagnum (Sphagnum spp.) mosses are common but don't typically occur in deep layers with pronounced hummocks. Floristic diversity is higher than in the Open Bog and may include white beak-rush (Rhynchospora alba), pitcher-plant (Sarracenia purpurea), sundews (Drosera spp.), pod grass (Scheuchzeria palustris), and the pink-flowered orchids (Calopogon tuberosus, Pogonia ophioglossoides, and Arethusa bulbosa). Common sedges are (Carex oligosperma, C. limosa, C. lasiocarpa, C. chordorrhiza), and cotton-grasses (Eriphorum spp.). Stands of this peatland fen community are uncommon in the Wolf River Basin

Wet-Mesic Prairie

This herbaceous grassland community is dominated by tall grasses including big bluestem (Andropogon gerardii), Canada bluejoint grass (Calamagrostis canadensis), cordgrass (Spartina pectinata), and Canada wild-rye (Elymus canadensis). The forb component is diverse and includes azure aster (Aster oolentangiensis), shooting-star (Dodecatheon meadia), sawtooth sunflower (Helianthus grosseseratus), prairie blazing-star (Liatris pycnostachya), prairie phlox (Phlox pilosa), prairie coneflower (Ratibida pinnata), prairie docks (Silphium integrifolium and S. terebinthinaceum), late and stiff goldenrods (Solidago gigantea and S. rigida), and culver's-root (Veronicastrum virginicum). Only a few tiny remnants were documented, in the extreme southern part of the basin.

Geological features/Primary communities

Bedrock Glade

These are xeric, sparsely vegetated level to sloping bedrock exposures with very thin, often discontinuous soils. The rock types vary from quartzite (Baraboo Hills, McCaslin Mountain), to basalt (lower St. Croix River valley), to granite (northeastern Wisconsin). The flora can include prairie, savanna, or barrens components, some at their northern range limits. Trees and shrubs are sparse and may include pines, oaks, and cherries. Xerophytic pteridophytes such as rusty woodsia (Woodsia ilvensis) and rock spikemoss (Selaginella rupestris) are characteristic, as are lichens and mosses. Rock glades occur along the Wolf River north of Shawano, but are rare in the Wolf River Basin.

Dry Cliff (**Exposed Cliff** of Curtis' community classification)

These dry vertical bedrock exposures occur on many different rock types, which may influence species composition. Scattered pines, oaks, or shrubs often occur. However, the most characteristic plants are often the ferns, common polypody (Polypodium vulgare) and rusty woodsia (Woodsia ilvensis), along with herbs such as columbine (Aquilegia canadensis), harebell (Campanula rotundifolia), pale corydalis (Corydalis sempervirens), juneberry (Amelanchier spp.), bush-honeysuckle (Diervilla lonicera), and rock spikemoss (Selaginella rupestris). Few stands of this community are known from the Wolf River Basin. However, cliff communities have not been targets of any recent inventory efforts in the Wolf River Basin.

Inland Beach

The beaches of inland lakes that experience enough water level fluctuation to prevent the development of a stable shoreline forest or other community may, instead support a specialized biota adapted to sandy or gravelly littoral habitats. The shorelines of such lakes (usually seepage lakes) may be subject to fluctuations of as much as several meters over a few years or decades. The alternation of high and low periods maintains populations of the beach specialists over time, including some rare species of unusual geographic affinity such as the Atlantic Coastal Plain of the eastern United States. Several important stands, with rare species documented, occur in the southwest Wolf River Basin.

Moist Cliff (**Shaded Cliff** of the Curtis community classification)

This "micro-community" occurs on shaded (by trees or the cliff itself because of aspect), moist to seeping mossy, vertical exposures of various rock types, most commonly sandstone and dolomite. Common species are columbine (Aquilegia canadensis), the fragile ferns (Cystopteris bulbifera and C. fragilis), wood ferns (Dryopteris spp.), rattlesnake-root (Prenanthes alba), and wild sarsaparilla (Aralia nudicaulis). The rare flora of these cliffs vary markedly in different parts of the state; Driftless Area cliffs might have northern monkshood (Aconitum noveboracense), those on Lake Superior, butterwort (Pinguicula vulgaris), or those in Door County, green spleenwort (Asplenium viride). Few stands of this community are known from the Wolf River Basin. However, cliff communities have not been targets of any recent inventory efforts in the Wolf River Basin.